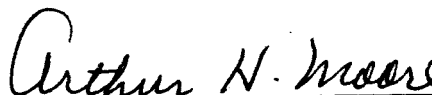


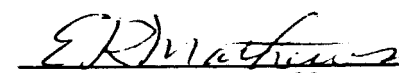
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FLIGHT SAFETY PLAN  
VEHICLE AS-203**

June 1, 1966

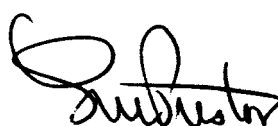
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## **SECTION I INTRODUCTION**

### **1.1 PURPOSE**

This Flight Safety Plan presents flight safety requirements, restrictions, and instrumentation necessary for each launch. The plan defines flight safety responsibilities of the Air Force Eastern Test Range (AFETR) and Kennedy Space Center (KSC). The requirements for flight termination and propellant dispersion are described, and the restrictions and instrumentation applicable for each Apollo/Saturn IB flight are listed.

### **1.2 AUTHORITY**

The Flight Safety Plan is authorized within KSC by the Apollo Test Requirements Document, M-D MA 1400, dated May 20, 1964.

### **1.3 SCOPE**

This plan is applicable during the launch countdown and throughout powered flight of the vehicle.

## **SECTION II FLIGHT SAFETY RESPONSIBILITIES**

### **2.1 AIR FORCE EASTERN TEST RANGE**

The Webb-McNamara agreement of January 17, 1963, supplemented by the AFMTC/LOC agreements of June 5, 1963, places the responsibility for flight safety of all launches from the AFETR on the Commander of the AFETR. This responsibility includes specifying flight termination system requirements, protecting life and property from an errant vehicle (except within KSC), establishing data requirements, impact limit lines, flight safety instrumentation requirements, etc.

### **2.2 KENNEDY SPACE CENTER**

By the same agreements cited in paragraph 2.1, the Director, KSC, is responsible for the protection of life and property within KSC from an errant vehicle launched or intended to be launched from the Cape or KSC. This responsibility includes designating launch danger areas within KSC, clearing these areas during danger periods, etc. Also included is the responsibility for Crew Safety on manned launches from KSC. This responsibility does not include Range Safety control of the vehicle after lift off, which is the sole responsibility of the Commander of the AFETR. To that extent, the protection of life and property within KSC is a joint effort of KSC and AFETR.

### SECTION III FLIGHT SAFETY REQUIREMENTS

All ballistic or space booster vehicles launched at the AFETR must contain two independent flight termination systems which are compatible with the AFETR ground system. The two systems must be installed on the last powered stage and must be capable of destroying all powered stages of the vehicles. For stages that go into orbit prior to ignition, a command system is not required. However, the stage must be capable of being destroyed by command from the preceding stage and also must contain an automatic flight termination system. All stages that do not contain a command system must contain an automatic flight termination system. The automatic flight termination system destroys the thrust capability of the stage in the event of premature separation or break-off from the other stages carrying a flight termination system. The termination system is automatically activated by mechanical means when premature separation or break-off occurs. The manned portion of a space vehicle will not require a destruct system on manned flights. Propulsive systems that are not considered as a stage of a vehicle (retro-rockets, escape rockets, payloads, etc.) and which present radiological, toxicological, or explosive hazards will require an automatic flight termination system if they have the capability of violating the launch area or flight safety lines. For liquid-propelled vehicles, flight termination action must cause engine shutdown and fuel dispersion or intermixing, depending upon the nature of the propellants.

The Apollo/Saturn IB carries two independent flight termination and propellant dispersion systems in each active booster stage. There is no destruct system associated with the Apollo spacecraft. Figures 3-1 and 3-2 pictorially display the IB flight termination propellant dispersion system.

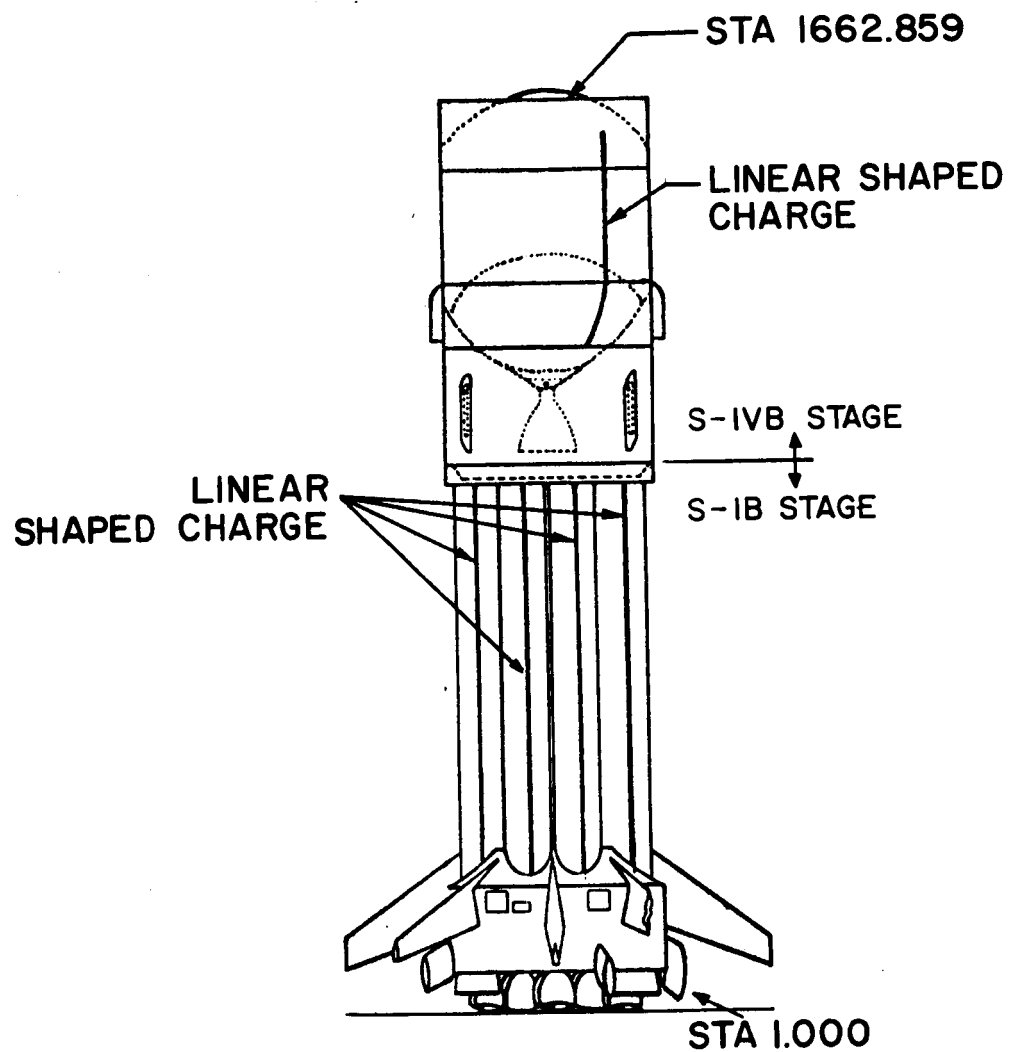
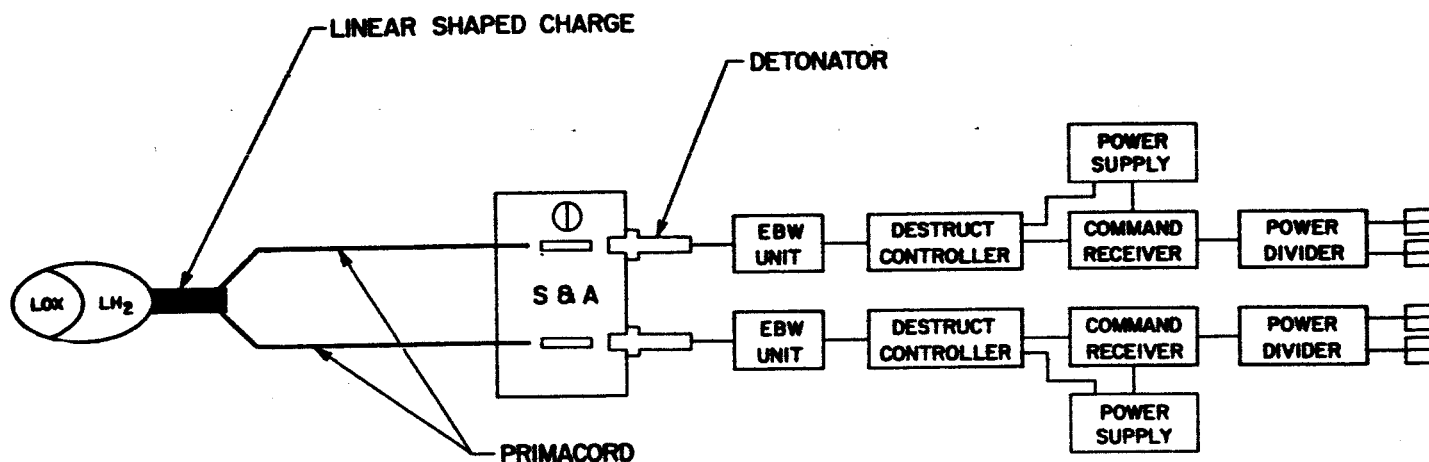
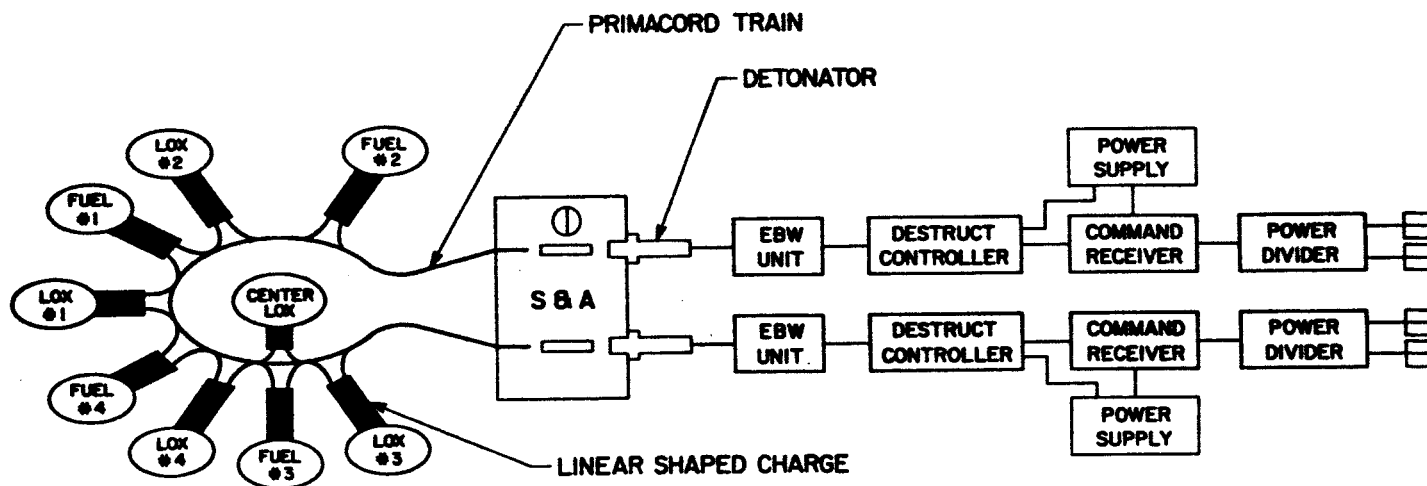


Figure 3-1. Propellant Dispersion Ordnance - Shaped Charge Locations





### S - IV B STAGE



### S - I B STAGE

Figure 3-2. Propellant Dispersion System Block Diagram

## **SECTION IV FLIGHT SAFETY RESTRICTIONS**

### **4.1 WEATHER MINIMUMS**

**4.1.1 CEILING.** A minimum ceiling height is imposed on all launches. The height of the ceiling is determined by the time required for the launch area radars to acquire the vehicle after liftoff. Minimum ceiling required for Apollo/Saturn 203 launch is 800 feet.

**4.1.2 VISIBILITY.** A minimum visibility limit is imposed on all launches. The visibility limit is determined by the vertical wire skyscreen site selected for the launch. For Apollo/Saturn 203, vertical wire skyscreen 1.9, which is approximately two miles from Launch Complex 37, will be used.

**4.1.3 WINDS.** A wind restriction is usually imposed on the launch if the vehicle remains over Cape Kennedy for any length of time. This restriction prevents pieces of a destructed vehicle from drifting into protected areas. The wind restriction for Apollo/Saturn 203 is a 1.25  $\sigma$  annual wind profile blowing from 65 degrees east of north (Figure 4-1) and applicable to an altitude of 30 kilometers. In the event this profile is violated by prevailing wind conditions during countdown, the range safety division performs a computer-simulated flight, terminating thrust and breaking the vehicle into pieces at regular intervals along the trajectory. A ballistic trajectory is then calculated for the pieces at each interval, with the prevailing winds acting on them to determine if the pieces can fall outside the impact limit lines.

### **4.2 OPERATIONAL RESTRICTIONS**

**4.2.1 LAUNCH VEHICLE.** NONE

**4.2.2 SPACECRAFT.** Not applicable for Vehicle AS-203.

**4.2.3 CREW SAFETY.** Not applicable for Vehicle AS-203.

**4.2.4 OTHER CONSIDERATIONS.** Other agreements and/or restrictions that have a bearing on the overall flight safety picture have been reached mutually.

A time delay will be imposed between the commands "cutoff" and "destruct." This interval is governed by a timer on the Range Safety Officer's (RSO) console. The timer for Vehicle AS-203 has been set for two seconds.

When the S-IVB has achieved orbital conditions and cutoff has occurred, the safing command will be sent as soon as the RSO is satisfied that the command destruct system

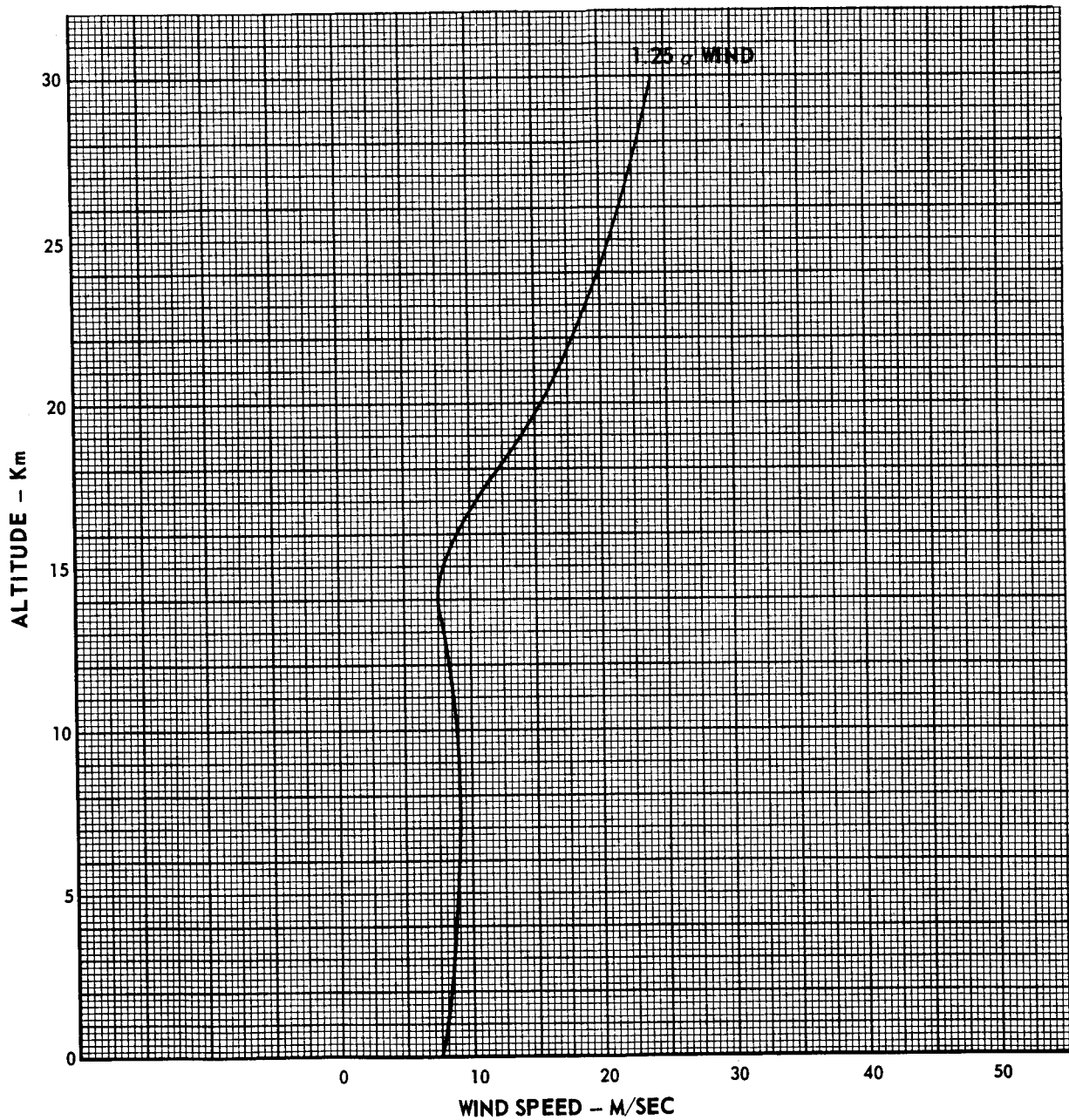


Figure 4-1. 1.25  $\sigma$  Annual Wind Profile from 65-Degree Azimuth

is no longer needed. The safing command will remove power from the command receivers and, in case the firing capacitors have been charged, will discharge the capacitors to ground.

The Digital Command transmitter at Bermuda (station 67) will be MANDATORY for launch.

## SECTION V FLIGHT SAFETY INSTRUMENTATION

The AFETR requires that at least two different, adequate sources of safety data for each phase of powered flight be operational at launch. An "adequate" source is defined as one which can protect the applicable impact limit line without endangering a normal missile. The RSO will ensure that the adequate data source requirement is met and that those requirements designated "critical" are provided before giving a launch clearance. Those items designated "critical" for AS-203 are:

1. Forward Observer
2. Impact Predictor

Instrumentation available during S-IB stage powered flight are:

1. High Resolution Trackers (HRT) 1 & 2
2. KSC TPQ 18 C-Band Radar (19.18)
3. Patrick AFB TPQ 18 C-Band Radar (0.18)
4. Glotrack Station I
5. Program and Flightline ELSSE
6. Impact Predictor
7. Cape FPS 16 C-Band Radar (1.16)

Instrumentation available during S-IVB stage powered flight are:

1. KSC TPQ 18 C-Band Radar (19.18)
2. Patrick AFB TPQ 18 C-Band Radar (0.18)
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5. Antigua TPQ 18 C-Band Radar (91.18)
6. Flightline ELSSE
7. Impact Predictor

APPENDIX A  
DOCUMENT CATEGORIES

APOLLO/SATURN IB  
FLIGHT SAFETY PLAN  
VEHICLE AS-203

<u>Category</u>	<u>Brief Description of Related Contents</u>	<u>Emphasis</u>		<u>See Page(s)</u>
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11. Safety	Plan presents flight safety requirements, restrictions, and instrumentation necessary for each Apollo/Saturn IB launch.		X	1-1

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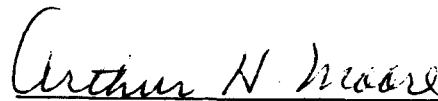
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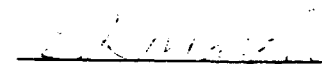
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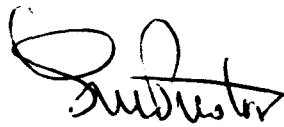
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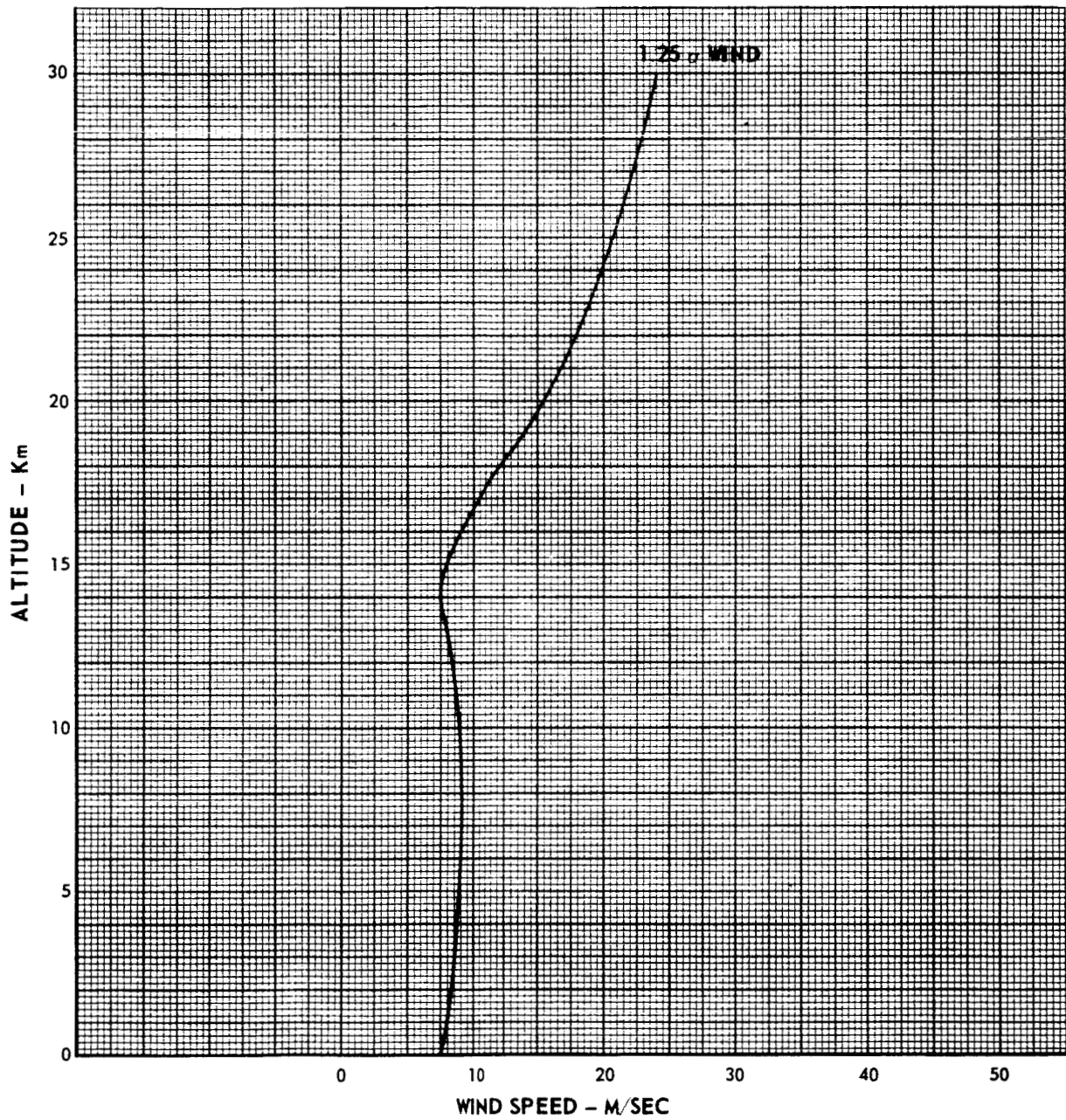


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VEHICLE AS-201

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